Basic Cognitive Abilities in Interpreting and Their Changes Over Human Life Span: A Developmental Psychology Perspective

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Abstract

Interpreting is a special language processing activity involving a multiplicity of abilities, among which cognitive abilities are of key importance and received the most attention from interpreting researchers. By drawing on cognitive psychology and developmental psychology, this paper has briefly surveyed three major cognitive abilities that are functioning at the core of the interpreting process. As these cognitive abilities are subject to the law of aging, this paper has further discussed the possible impact that aging-associated decline of these cognitive abilities might exert on the performance of interpreters.

Key words: Cognitive abilities; Interpreting; Aging-associated decline

INTRODUCTION

As a special language processing activity, interpreting involves a multiplicity of abilities, which, according to some influential researchers and professional interpreters, can be relegated to the following ten categories: linguistic competence, interpreting skills, mental composure, encyclopedic knowledge, cognitive abilities, public speaking skills, communicative strategies, working experience, team work spirit and professional ethics (Pöchhacker, 2004, p.166; Zhong, 2009; Liu, 2002, p.125). While some of these categories like communicative strategies, working experience and spirit of team work are shared by many other professionals, such as school teachers, lawyers and business managers, others like linguistic competence, interpreting skills and encyclopedic knowledge are essentially working on the basis of our cognitive abilities. Therefore, the study on our cognitive abilities naturally falls into the core sphere of Interpreting Research (IR).

Cognitive ability is actually an umbrella term covering all the abilities related to our consciousness and the qualities of our mind (Hunt & Ellis, 2006, p.79). However, with regard to interpreting activities, we would like to single out three major cognitive abilities, namely, information processing speed, attention managing and memory as our primary concerns. The preference for the three abilities is justified by the working process of interpreting, which requires the interpreter to listen to the source language attentively, store the source text in his or her working memory, analyze the surface structure of the source text in order to reach the proposition, and communicate the proposition to the audience of the target language within the shortest possible period of time.

Since our cognitive abilities are subject to the law of aging, certain changes occur to them at different stages within the human life span. A close examination of these changes can shed light on how professional interpreters adjust the aforementioned ten abilities to specific interpreting tasks and properly allocate their cognitive resources in order to maintain the quality of their interpreting performance. Given the widely circulated stereotype in the context of the Chinese market that interpreters, as they are getting on age, are reluctant

to do interpreting out of the fear that the deterioration of their cognitive abilities might disqualify them from the job, it is of practical significance to find out how these cognitive abilities change within human life span, to what extent these changes have influenced the performance of interpreting and what strategies are needed to cancel out the negative influence.

1. INFORMATION PROCESSING SPEED

Interpreting is compared to playing tennis by some interpreters (Jones, 2008, p.15). A tennis player first has to predict with a fair amount of accuracy where the next ball will fall, then move to that place and bat the ball back. In this process, the player's decision-making and action are determined by the movement and trajectory of the ball. When interpreting, an interpreter will first predict in which direction the source speech flows, process the source text received and communicate the meaning to the audience in the target language. The information processing carried out in his or her mind is determined by the flow of the source language speech which, different from a written text, is ephemeral. Therefore, an interpreter has to process the information accurately and speedily, otherwise the information processing channel in their mind will be congested and information lost or total breakdown of the working mechanism will be resulted.

Our information processing speed often influences how well we can handle the information we have to work on. If you are trying to add up in your mind the cost of items you are buying at the supermarket, you need to be able to compute the sum before you have forgotten the price of the individual items. In interpreting, similarly, an interpreter must be able to interpret a speech segment before he/she is further burdened by another segment. While interpreting, analysis, comprehension, reformulation and reproduction are all severely affected by time constraint and at the same time competing for limited cognitive resources, it is necessary to make sure that each of these tasks will be completed within as short a period of time as possible. When time spent on a single task is reduced without hampering the quality, surplus time and cognitive resources can be saved for other tasks. Professional interpreters hold that the time for reproduction should not be longer than that of the original speech, otherwise not only will the smooth communication be disrupted, but some of the audience will feel bored by the dawdling pace of the meeting (Cai, 2007, p.56). To meet this requirement, an interpreter must increase his or her information processing speed in order to ensure a fast and articulate delivery.

There is a controversy over whether the increase in processing speed is due to experience or biological maturation. Experience clearly plays an important role, because experienced interpreters, in comparison with novice interpreters of the same age, are believed to be more efficient and therefore faster in information processing (Elisabet, 2015, pp.152-153).

However, Schaie (1996) reported that information processing speed began to decline in early adulthood and continued to decline further in middle adulthood. The slowdown in processing speed continues into late adulthood (Hayslip & Panek, 2001, p.198). Physiologically speaking, the decline of the processing speed as people are getting on age is inevitable, because it is dictated by the law of nature. The decline in processing speed in older adults is likely to be a decline in the functioning of the brain and central nervous system (Groth, Gilmore, & Thomas, 2003). Given this unpleasant truth, an interpreter must learn to summon his or her other interpreting resources to compensate for the loss in his processing speed, for example, improving interpreting skills, enhancing encyclopedic knowledge and strengthening language competence. In this respect, statistics on to what extent interpreters are really affected by a declined information processing speed are much in need. However, there has never been an empirical research conducted as yet.

Although the decline of the information processing speed is the corollary of the law of nature, health and exercise may influence how much decline in processing speed occurs (Gerristen, 2003). Those with better physical condition tend to be less influenced by aging. This at least reminds the interpreters the necessity to maintain good health through proper exercise.

2. ATTENTION

An interpreter is doing a very complicated mental work while interpreting by allocating his or her attention to three different activities. He/she is listening and analyzing the source language speech, memorizing the meaning of it, and producing the speech in target language. Not only is the decoding of speakers' message requiring attention but also the planning of a proper rendition. Besides, an interpreter's attention may be distracted by other sources. Some interpreters may have experience the scenario that in the middle of a speech, they were given a short note which directed them to other objects while they were fighting to interpret the speech going on. The task of interpreting itself and interpreter's experience tell them that they must learn how to manage their limited attentional resources.

Attention is the focusing of mental resources. Of its many definitions, the most classic one is given by William James:

> Everyone knows what attention is. It is the taking procession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration and consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others. (James, 2013, p.55).

This definition implies that at any one time, people can only bring limited objects into their attention. Our attentional system has a limited capacity for the simple reason that we can take on certain amount of information at any given moment rather than the belief that information is limited because it has to pass through filters. Individuals can allocate their attention in different ways. Psychologists have labeled three types of allocation, namely, sustained attention, selective attention, and divided attention (Santrock, 2005, p.79).

Sustained attention is the state of readiness to detect and respond to small changes occurring at random times in the environment. Sustained attention is also called vigilance. Selective attention is focusing on a specific aspect of experience that is relevant while ignoring others that are irrelevant. Focusing on one voice among many in a crowded room or a noisy restaurant is an example of selective attention. When you switched your attention to the toes on your right foot, you were engaging in selective attention. Divided attention involves concentrating on more than one activity at the same time. If you are listening to music or the television while you are reading this paper, you are engaging in divided attention.

It can well be said that interpreting involves all the aforementioned attentions with difference only in the amount. Obviously, in consecutive interpreting selective attention is of greater importance as the interpreter is always trying to select the speech of the speaker of the meeting as the predominant focus. In the delivery phase, an interpreter will shift the focus of his or her attention to the reproduction of the speech. Of course, a certain amount of divided attention is required, for a consecutive interpreter has to take notes now and then, and formulate possible interpretation in his or her mind while concentrating on the original speech. Simultaneous interpreting involves a greater amount of divided attention because when a simultaneous interpreter is at work, he/she is focusing on the original speech and reproducing the speech in the target language almost concurrently. With information input and output happening nearly at the same time, a simultaneous interpreter must learn to split his/her attention. The demand for attention is severe in both consecutive and simultaneous interpreting, for the interpreter has to finish his work in a limited time. The continuous demand for the allocation of attention consumes the limited capacity of the interpreter's attention resource. A good control and an appropriate division of attention are decisive in the completion of a successful interpreting task.

Attention skills, which are of key importance for interpreters are often excellent in early adulthood. Older adults may not be able to focus on relevant information as effectively as younger adults (Hogan, 2003). Older adults perform as well as middle-aged and younger adults in sustained attention, but tend to be less adept in selective attention – focusing on a specific aspect of experience while ignoring others – than younger adults are (Santrock, 2005, p.92). The ability to allocate attention properly by performing multitask differs greatly between younger and older adults. Researchers have found that when two competing tasks performed are reasonably easy, age differences among adults are minimal or nonexistent. However, as competing tasks become more difficult, older adults divide attention less effectively than younger adults (Ibid., p.104).

The deterioration of attentional skills, with regard to age, definitely has a direct bearing on an interpreter's working ability. The findings made by psychologists theoretically imply that if older interpreters are not aided by other advantages which young interpreters do not have, their interpreting performance will be less satisfactory than that of the younger ones. As the ability to allocate attention properly in performing multitask differs greatly between younger and older adults, and all the more so when the task at hand is complicated, such as in simultaneous interpreting, the difference between the interpreting qualities of the two age groups will be significant.

However, at present much empirical research on attention that has already been carried out is not intended for interpreting research. The tentative conclusion we have drawn at this juncture is based on psychological research on attention. Further empirical research is needed to find out how interpreter's working ability is affected by the deterioration of attentional skills resulted from aging. A contrastive study of the quality of the interpreting performance between younger and older interpreter groups is not enough for the simple reason that interpreting never involves only one skill and an older interpreter is often aided by his or her richer experience, better command of interpreting skills and an ever increasing store of encyclopedic knowledge.

3. MEMORY

Memory has become a pet word for interpreting researchers since 1960s (Pöchhacker, 2004, p.120). With the rapid development of cognitive psychology and cognitive linguistics of 1990s, the relationship between memory and interpreting is of key importance for the cognitive study of interpreting (Liu, 2005, p.83). Memory has been labeled differently according to its different functions and characteristics. Traditionally, psychologists make a distinction among sensory store, short-term memory and long-term memory.

Sensory memory refers to the initial, momentary storage of information which lasts only for an instant. It preserves fleeting impressions of sensory stimuli: sights, sounds, smells, and textures for only a second or two. It is also sometimes called the sensory register, which is essential for the task of holding input long enough to be

recognized and passed on for further processing (Gui, 2000, p.143).

Short-term memory is the retention of information for up to 15 to 30 seconds, without rehearsal of the information. Using rehearsal, individuals can keep the information in short-term memory longer. A stimulus that has been recognized by sensory memory will be transferred to short-term memory and intermediate memory process between the fleeting events of sensory memory and the more permanent storage of long-term memory. Miller (1956) identified the capacity of short-term memory at seven plus or minus two pieces of information. He first used the term chunk to refer to the unit of temporary retention. According to him, a chunk is a meaningful grouping of stimuli that can be stored as a unit in short-term memory. Essentially, a piece of information can be anything, and with the help of long-term memory its size is not limited. Smaller bits of information can be recorded into larger bits. The recoding process is called chunking (Ibid.).

Long-term memory, which is also known as permanent memory, is the store house of all the experienced events, information, emotions, skills words, categories, rules and judgments that have been transferred into it from sensory and short-term memories (Gui, 2000, p.112). Information-processing researchers divided long-term memory into three main components: episodic memory, which is long-term memory of specific experiences or event, linked to time and place; semantic memory, which is long-term memory of general factual knowledge, social customs, and language; procedural memory, which is long-term memory of motor skills, habits, and ways of doing things, which often can be recalled without conscious effort (Santrock, 2005, p.69).

Since 1974, the British psychologist Alan Baddeley

has been developing the concept of working memory (Song & Zhang, 2004). The principle difference between working memory and short-term memory is that working memory is not an unitary storage concept (Hunt & Ellis, 2006, p.54). Like short-term memory, working memory is assumed to be a limited capacity system containing transient information. Unlike short-term memory, however, the function of working memory is less a matter of a storage way station to long-term memory than of holding information used for other cognitive work. Some interpreting researchers have equated short-term memory to working memory (Li, 2004), and have confused these two concepts. It can well be said that working memory is a mental workbench where individuals manipulate and assemble information when making decisions, solving problems, and comprehending written and spoken language. From an interpreting researcher's point of view, working memory is of greater importance because while interpreting, an interpreter not only has to store the information, but also actively processes it.

Baddeley's concept of working memory includes four components (Baddeley, 2000). The central executive is the controlling, decision-making mechanism of working memory that functions to recruit and perform operations required by the current task, as well as to assign capacity in the working memory subsystems. The three subsystems that have received some research effort are the phonological loop, visualisation sketchpad, and the episodic buffer, each of which is a temporary storage system. Visual-spatial material is stored and manipulated by the visualisation sketchpad, whereas speech-based material is stored and manipulated by the phonological loop. These subsystems are essentially modality-specific storage. The episodic buffer stores are multidimensional representations, information that is integrated across modalities.
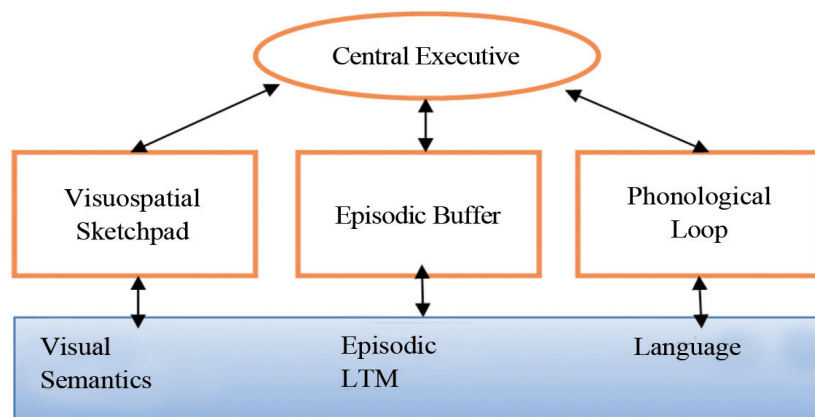

Figure 1
The Components of Working Memory (Adapted From Baddeley, 2000)

The phonological loop consists of a store for verbal materials and a sub-vocal rehearsal process called articulatory control. Visual material must be recorded into a phonetic code before it registers in the phonological loop. Recoding of the visual material is a function of the

articulatory control process, which is sub-vocal rehearsal and functions to maintain items in the store as well as to accept new items. Visually presented items or objects are entered into the phonological loop by articulation of the name of the item or object.

The importance of articulatory control is apparent when rehearsal is prevented by articulatory suppression. Articulatory suppression introduces irrelevant speech which disrupts performance by occupying storage. Articulatory suppression occupies the articulatory control process so that rehearsal cannot occur.

As a special language processing activity, simultaneous interpreting permits the interpreter very limited time to reformulate the original speech. While the interpreter is listening, comprehending and storing the source language, he/she is producing and monitoring the target language. In other words, simultaneous interpreting is a typical articulatory suppression phenomenon. The production of speech in the target language has intervened the processing of the source language speech in an interpreter's working memory system. Listening, comprehending, storing, reformulating, reproducing and monitoring, which are all happening simultaneously, have brought great pressure to a simultaneous interpreter's working memory. Therefore, a good working memory is one of the key cognitive abilities to ensure the quality of an interpreter's performance.

The other two components of working memory system, the visuo-spatial sketchpad and episodic buffer have not gained so much attention as that of the phonological loop. The visuo-spatial sketchpad is the component of working memory. Its main function is to store and work with visual-spatial information. The episodic buffer has been added to the subsystems of working memory to account for observations that cannot be explained by the other three components (Baddeley, 2000).

Just like information processing speed and attentional abilities, certain changes occur to memory with the process of aging. Researchers have asked subjects to repeat a sequence of numbers, either in the order in which they were presented (digit span forward) or in reverse order (digit span backward). Digit span forward ability holds up well with advancing age, but digit span backward performance does not. A possible explanation is that backward repetition has a greater demand on working memory which gradually shrinks in capacity after about age 45 (Swanson, 1999).

What explains older adults' losses, especially in working memory and episodic memory? Investigators have offered several hypotheses. Traditional approach focuses on problems with the three steps required to process information in memory: encoding, storage and retrieval. Another approach focuses on the biological structures that make memory work. Even though these two approaches still lag far behind the research on working memory, they nevertheless can shed some light on how memory changes throughout the human life span.

Older adults tend to be less efficient and precise than younger ones in encoding new information to make it easier to remember, for example, by arranging material alphabetically or creating mental associations (Craik & Byrd, 1982). Another hypothesis is that material in storage may deteriorate to the point where retrieval becomes difficult or impossible. Some research suggests that small increase in "storage failure" may occur with age. Older adults have more trouble with recall than younger adults but do about as well with recognition, which puts fewer demands on the retrieval system. Even in recognition task, however, it takes older people longer than younger ones to search their memories (Feldman, 2010, p.132).

From the biological perspective, a general slowdown in central nervous system functioning seems to be a fundamental contributor to age-related memory loss (Luszcz & Bryan, 1999). Theoretically speaking, the shrink of working memory capacity definitely has some negative influence on an interpreter's working performance as working memory is the key cognitive factor involved in interpreting. However, without empirical research it is still hard to tell whether the quality of an interpreter's working performance will decline because of the deterioration of his or her working memory. Furthermore, some interpreters' experience seems to counter this assumption given the fact a few active practitioners of this career, especially with Indo-European language pairs, are actually in advanced age.

CONCLUSION

In the complex process of interpreting, information processing speed, attention and memory come into work from the first listening phase to the last reproduction phase. To some extent, these three factors have a direct bearing on the quality of interpreting performance. A good interpreter must be able to excel himself/herself at least in these three aspects. While choosing interpreting trainees in interpreting training institutions, these three factors can also serve as very important parameters to assess a trainee's aptitude.

Information processing speed, attention and memory all show some decline throughout human life span. Theoretically, the shrink of their capacity will have some negative impact on the quality of interpretation. This assumption partly accounts for the fact that not many older adults (above 60) persist with the job of interpreting in context of the Chinese market.

Researches on the relationship between aging-associated deterioration of the basic cognitive abilities and interpreting is carried out only on a theoretical basis and the conclusions drawn in this paper are but from theoretical reasoning. Further empirical research on changes in the above mentioned three cognitive abilities over the human life span and their specific influence on the quality of interpreter's performance is much in need.

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